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TITLE: COATED PAPER FOR GRAVURE PRINTING

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide a low-density coated paper for gravure printing having suitability for gravure printing, having high glossiness of white paper and stiffness and improved in high opacity and specification.

SOLUTION: This coated paper for gravure printing provides a coated layer having pigment and an adhesive on a base paper. The coated paper for gravure printing is characterized by providing a coated layer containing ≥ 50 pts.wt. (based on 100 pts.wt. pigment) kaolin, as the pigment, having particle diameter distribution contained in an amount of $\geq 65\%$ in a range of 0.4-4.2 μm based on volume and a copolymer latex having -50°C to 0°C glass transition temperature as the adhesive.

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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 03/28/2008 / Priority: 1. Chemistry / 2. JIS (Japan Industrial Standards) term / 3.

Mathematics/Physics

FULL CONTENTS

[Claim(s)]

[Claim 1] In the coated paper for gravure which prepared the coating layer which has a pigment and adhesives on stencil paper The kaolin which has as a pigment the particle size distribution included 65% or more in the range of 0.4-4.2 micrometers on a volume basis per pigment 100 weight part More than 50 weight parts Coated paper for gravure characterized by preparing the coating layer containing copolymerization latex whose glass transition temperature is -50 degree-C-0 degree C as adhesives.

[Claim 2] Coated paper for gravure according to claim 1 characterized by being the stencil paper which contained mechanical pulp 10weight % or more as paper pulp.

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the coated paper for gravure equipped with the outstanding blank paper appearance and the outstanding printability.

[0002]

[Description of the Prior Art] Gravure is the intaglio-printing method of transferring the ink for a crevice of a version under pressurization, and since it excels in tone reproduction, it is used in the commercial printing fields, such as a magazine, a catalog, and a pamphlet, etc. There is a strong request from points, such as saving resources, transportation, and mailing cost, also to the weight saving of printed matter, and what excelled [density / low] in printability is called for.

[0003] In gravure, since it is hard to stick a printing plate to a paper with a metal roll hard in a version completely as compared with offset printing at the time of printing, the phenomenon

which the half tone dot called a speckle does not transfer normally may occur. When there are many these speckles, it becomes deterioration of printing quality. In order to control the development of a speckle, the Taira slippage and cushioning properties of coated paper are important. In order to raise the smoothness of the coating layer surface of the coated paper for gravure, to blend the high pigments (delaminated clay, a talc, etc.) of an aspect ratio into a coating layer packet product generally is validated.

[0004] However, the viscosity of a coating slip rises, the handling at the time of preparation is difficult for blending many high pigments of an aspect ratio into a coating layer packet product, and it becomes the cause that coatings, such as a streak and a scratch, are poor, easily. For this reason, the present condition is being unable to make solid content concentration of a coating material not much high, and, as a result, it will be necessary to strengthen desiccation conditions, and will be connected with a cost overrun. Moreover, a pigment called high delaminated clay and the high talc of an aspect ratio, Since it has the characteristics that blank paper glossiness becomes low when loadings are increased so that it may understand also from generally being mostly used for a use with low blank paper glossiness like lusterless coated paper, it is not suitable for the use which needs high blank paper glossiness.

[0005] Moreover, although how to use calcination Clay together with other pigments for the purpose of the occurrence prevention of a speckle and the increase in opacity is also known, since calcination Clay is inferior to flowability, it is, The viscosity of a coating slip rises, it is easy to become the cause that coatings, such as a streak and a scratch, are poor, and the workability in coater may get worse. For this reason, solid content concentration of a coating material cannot be made not much high.

[0006] On the other hand, organic pigments, such as a plastics pigment, are used and the method of giving high blank paper glossiness, the preventive effect of a speckle, opacity, etc. is known (JP,S64-20396,A). However, since it is expensive as compared with an inorganic pigment, an organic pigment serves as a cost overrun, the viscosity under high shearing rises easily and the coating slip which added the organic pigment further becomes the cause that coatings, such as a streak and a scratch, are poor, easily. For this reason, the present condition is being unable to make solid content concentration of a coating material not much high, as a result, it will be necessary to strengthen desiccation conditions, and there is a problem that it is connected with a cost overrun.

[0007] Moreover, advanced pressure treatment which uses a super calender is usually performed as the technique of making smooth mechanically the coating layer surface of the coated paper for gravure, and giving blank paper glossiness. Although the effect that the surface treatment by a super calender raises smoothness and blank paper glossiness is acquired, the density of coated paper increases simultaneously and the opacity of coated paper and stiffness are lost. When opacity is insufficient, it becomes deterioration of quality by

a printing pattern's penetrating, and affecting a printing pattern on the back, or spoiling a feeling of a blank paper side on the back. Moreover, in order to lose neither opacity nor stiffness, pressure treatment needed to be reduced, but since it usually became the fall of blank paper glossiness, and the increase in the speckle at the time of gravure simultaneously, the present condition was that the pressurization of a super calender is seldom unmitigable. Moreover, when a soft nip calender was used, pressurization could not fully be reduced, but there was a problem in which a fall, a roll soil, etc. of opacity or stiffness occur.

[0008] From the above backgrounds, development of the good coating photogravure paper of printing quality was desired highly [opacity and stiffness are high and / blank paper glossiness] by the low density.

[0009]

[Problem(s) to be Solved by the Invention] In view of such a situation, the technical problem of this invention is a low density, and there is in offering the coated paper for gravure with the gravure aptitude by which it has high blank paper glossiness and stiffness, and high opacity and a high speckle have been improved.

[0010]

[Means for Solving the Problem] In the coated paper for gravure which prepared the coating layer which has a pigment and adhesives on stencil paper as a result of this invention person's etc. inquiring wholeheartedly about the above-mentioned technical problem The kaolin which has the particle size distribution included 65% or more in the range of 0.4-4.2 micrometers on a volume basis as a pigment per pigment 100 weight part More than 50 weight parts By preparing the coating layer containing copolymerization latex whose glass transition temperature is -50 degree-C-0 degree C as adhesives, in spite of the low density, it has the outstanding gravure aptitude of dissolution of high blank paper glossiness and a speckle, and found out that stiffness and opacity were high, and this invention was completed.

[0011] In this invention, it is required for the range of 0.4-4.2 micrometers as a pigment for coatings for more than 50 weight parts to blend the kaolin which has the particle size distribution included 65% or more per pigment 100 weight part on a volume basis, and they are more than 80 weight parts preferably. When the kaolin which has the particle size distribution included 65% or more in the range of 0.4-4.2 micrometers on a volume basis is less than 50 weight %, in blank paper glossiness or printing glossiness, a fall or a speckle increases. The grains which go into the range of 0.4-4.2 micrometers on a volume basis are less than 65%, when volume integral cloth grains use kaolin containing many small grains, blank paper glossiness becomes high, but printing glossiness is low and the number of speckles increases. Moreover, [the grains included in the range of 0.4-4.2 micrometers are less than 65%, when volume integral cloth grains use kaolin containing many large grains, the number of speckles decreases, but] It is difficult to manufacture the coated paper for gravure which blank paper

glossiness became low too much, and was simultaneously equipped with the outstanding blank paper appearance and printability. The kaolin specified in this invention has many distribution to a comparatively bigger grain size than the pigment for coatings usually used, rather than the calendar process performed with the usual coated paper for photogravures, it is low-pressure conditions and high printability and high blank paper gloss are obtained. Therefore, the increase in the density by a calendar process can be suppressed, and opacity and stiffness can be made higher than conventional gravure coated paper.

[0012] In this invention, the glass transition temperature of the copolymer latex used as adhesives contained in a coating layer needs to be -50 degree-C-0 degree C. By using the thing of this range, it becomes coated paper which has cushioning properties suitable for gravure. Since it becomes hard, the coating layer in which glass transition temperature was formed using copolymer latex over 0 degree C becomes inadequate [cushioning properties], and the speckle at the time of gravure increases and it cannot acquire the outstanding printing quality. Moreover, when glass transition temperature uses copolymerization latex below -50 degree C, it becomes easy to generate what is called blocking that the stickiness nature of latex becomes high, and a roll soil tends to generate at the time of super calender treatment, and papers paste up by product rolling up, and is unsuitable on operation.

[0013] In this invention, by blending mechanical pulp 10weight % or more, the paper pulp which constitutes coating stencil paper can make opacity and stiffness still higher, and is 20 weight % - 60 weight % preferably. Since it is rare to crush paper by these pressures of various kinds of at a paper-making process and it becomes bulky as a whole, the increase of the amount of openings inside stencil paper and opacity of stencil paper, as for, mechanical pulp blended mechanical pulp since fiber was upright compared with chemical pulp improve, and stiffness also becomes large simultaneously. The contribution to the reduction in a density can use grand pulp preferably highly especially. Although the tree species in particular of mechanical pulp are not limited, the part in which gum wood, MEIPURU, a birch, etc. have big and rough fiber, and stencil paper become a low density easily.

[0014]

[Embodiment of the Invention] The constituent for coatings used for the coated paper for gravure of this invention is described below. More than 50 weight parts blend by using as the pigment for coatings the kaolin which has specific particle size distribution, and it is used combining the pigment of independent or this, and others. The kaolin which restriction in particular does not have in the kind of pigment for coatings combined and used, and is used for coated paper from the former, Clay, delaminated clay, whiting, precipitated calcium carbonate, One or more kinds can use organic pigments, such as inorganic pigments, such as a talc, titanium dioxide, barium sulfate, calcium sulfate, zinc oxide, silicic acid, silicate, colloidal silica, and a satin white, and a plastics pigment, mixing.

[0015] Although it is independent, or several sorts use glass-transition-temperature-50 degree-C-0 degree C copolymer latex as adhesives used in this invention, mixing, other adhesives, such as starch, can be used together in the range which does not spoil the purpose of this invention. As copolymer latex, it is the thing containing not only rubber system latex but a synthetic resin emulsion. Conjugated diene system copolymer latex, such as a styrene butadiene copolymer and a methacrylate butadiene copolymer, acrylic ester -- and -- or vinyl system polymer latex, such as a polymer of methacrylic ester, or a copolymer, -- Or these various polymer latex is used by one or more kinds, such as various kinds of synthetic resin polymers called the alkali solubility, the alkali bloating tendency, or alkali undissolved polymer latex and the binder pigment which denaturalized by the carboxyl group etc., choosing suitably. As for combination number of copies of copolymer latex, it is desirable to use it in 3 - 10 weight part to a pigment 100 weight part as solid content. The coated paper which copolymer latex manufactured under in 3 weight parts does not have [that it is easy to become weak] the desirable surface hardness of a coating layer to gravure. Moreover, a coating layer becomes hard, cushioning properties become inadequate, and the coated paper which copolymerization latex manufactured in the quantity exceeding 10 weight parts is in the tendency which the speckle at the time of gravure increases, and is not desirable to gravure.

[0016] As adhesives other than latex, for example Moreover, a casein, soybean protein, Protein, such as synthetic protein; Polyvinyl alcohol, olefin and maleic anhydride resin, Synthetic resin system adhesives, such as a melamine resin; Oxidized starch, positive starch, urea phosphorylation starch, Starch, such as etherification starch, such as hydroxy ethyl ether starch, and dextrin; you may use one or more kinds of usual adhesives [, such as a cellulosic,] for coatings, such as carboxymethylcellulose, hydroxyethyl cellulose, and hydroxymethyl cellulose, choosing them suitably.

[0017] Moreover, as an additive blended if needed, various assistants blended with the usual pigment for coated paper, such as a dispersant, a thickener, a water retention agent, a defoaming agent, a water resistant additive, and a colorant, are used suitably.

[0018] The prepared coating slip carries out the double-sided coating of one layer per one side, or more than a bilayer on stencil paper using blade coater, bar coater, a roll coater, air knife coater, a reverse roll coater, curtain coater, size press coater, gate roll coater, etc. 7-20g/m² per one side is desirable still more desirable, and the amount of coatings of this invention is 9-16g/m².

[0019] As coating stencil paper, chemical pulp, recycled pulp, mechanical pulp, etc. carry out paper pulp beating, and consider it as pulp slurry. The loading material usually used for pulp slurry at a paper-making process if needed, for example, a talc, kaolin, whiting, precipitated calcium carbonate, titanium dioxide, etc. are added, and paper making of medicine, for example, a paper reinforcing agent, a sizing compound, a defoaming agent, the colorant, etc.

is added and carried out further. Especially the paper-making methods may be any of the stencil paper which carried out paper making using the long network machine which is not limited and contains a top wire etc., the round mesh machine, the cardboard machine which used two persons together, the Yankee dryer machine, etc. by acid paper making, neutral paper making, and an alkaline paper-making method. Moreover, size press, gate roll coater, and pre metaling size press can be used, and the stencil paper which carried out the reserve coating of starch, the polyvinyl alcohol, etc. can be used. As for the basis weight of stencil paper, 40-200g/m² is desirable.

[0020] as a method of drying a humid coating layer, various kinds of methods, such as a steamy heating cylinder, a heating hot blast air dryer, a gas heater dryer, an electric heater dryer, an infrared heater dryer, and a high frequency heater dryer, are independent, for example -- or it is used together and used.

[0021] Since high printability and high blank paper glossiness are obtained like the above when a coating and the dried coated paper for photogravures blend a specific pigment, it is possible to reduce super calender conditions. Moreover, it is also possible to process in the high temperature soft nip calender of 100 degrees C or more using the high elastic roll and metal roll of hardness. As for the coated paper for gravure of this invention, an effect becomes remarkable at 70% or more especially more preferably than the density of 1.15g/cm³ or less, and 65% or more of blank paper glossiness.

[0022]

[Example] Although a work example is given to below and this invention is explained more concretely, of course, it is not limited to these examples. In addition, unless it refuses in particular, the part in an example and % show weight part and weight %, respectively.

[0023] In addition, it examined based on the appraisal method as shown below about the obtained coated paper for gravure.

(Particle-size-distribution measuring method) Using laser diffraction / dispersion type particle-size-distribution measuring instrument (Malvern instrument name master sizer S), the volume integral cloth grain size of the pigment was measured, and it asked for the percent of the pigment applicable to the range of 0.4 to 4.2 micrometers by calculation.

(Blank paper glossiness) It measured based on JIS P 8142.

(Printing glossiness) Using the Ministry of Finance type photogravure printing machine, by a part for /, and press speed printing pressure [of 40m] 10 kgf/cm, it printed and the surface of the obtained printed matter was measured based on JIS P 8142.

(Speckle) Viewing estimated the half tone dot lack state of the coated paper printed by the above-mentioned gravure method.

O : -- good and **: -- it measured based on a little inferior JIS P 8118 [x: inferior (density)].

(Opacity) It measured based on JIS P 8138, and evaluation was performed on the following

bases.

O : -- good and **: -- it measured based on a little inferior (stiffness) JIS P 8143, and evaluation was performed on the following bases.

O : -- good and **: -- a little inferior [work example 1]

[Preparation of a coating slip] 80 copies of engineered kaolin (: with ECLIPS650 by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 66.0%), To the pigment which consists of 20 copies of particle whiting (: with FIMATEC, LTD. make FMT-90 and a volume integral cloth grain size of 0.40-4.20 micrometers 66.3%), it is a dispersant. 0.2 copy of sodium polyacrylate was added with the opposite pigment, the SERIE mixer distributed, and pigment slurry whose solid content concentration is 70% was prepared. thus, the obtained pigment slurry -- un--- the met type acrylic synthesis water retention agent 0.2 copy and the glass transition point added the styrene butadiene copolymer latex A6 copy for photogravures which is -40 degree C, added water further, and obtained the coating slip of 63% of solid content concentration.

[Stencil paper] The wood containing paper with a basis weight of 42g/m² which contains mechanical pulp 30weight % as paper pulp was used as coating stencil paper.

[Manufacture of coated paper] The double-sided coating was performed by the blade coater of coating velocity for 500m/so that the amount of coatings per one side might become 12g/m² in the above-mentioned stencil paper about the above-mentioned coating slip.

[Calender] Super calender treatment was performed on condition of for 10m/in the roll temperature of 65 degrees C, 2 nip, calendar linear pressure 150 kg/cm, and **** velocity, and the coated paper for gravure was obtained.

[Work example 2] Set to preparation of the coating slip of a work example 1. The coated paper for gravure was obtained by the same method as a work example 1 except the glass transition point having changed into the styrene butadiene copolymer latex B6 part for photogravures whose glass transition point is -10 degree C instead of styrene butadiene copolymer latex A for photogravures which is -40 degree C.

[Work example 3] 60 copies of engineered kaolin (: with ECLIPS650 by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 66.0%), 20 copies of particle Clay (: with MIRASHEEN by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 60.2%), To the pigment which consists of 20 copies of particle whiting (: with FIMATEC, LTD. make FMT-90 and a volume integral cloth grain size of 0.40-4.20 micrometers 66.3%), it is a dispersant. 0.2 copy of sodium polyacrylate was added with the opposite pigment, the SERIE mixer distributed, and the coated paper for gravure was obtained by the same method as a work example 1 except having prepared pigment slurry whose solid content concentration is 70%.

[Work example 4] The coated paper for gravure was obtained by the same method as a work

example 1 except having used the wood containing paper which contains mechanical pulp 40weight % as paper pulp as coating stencil paper. To the pigment which consists of 100 copies of
[work example 5]> kaolin (: with CAPIM DG by RIOKAPIMU, and a volume integral cloth grain size of 0.40-4.20 micrometers 68.4%), it is a dispersant. 0.2 copy of sodium polyacrylate was added with the opposite pigment, the SERIE mixer distributed, and the coated paper for gravure was obtained by the same method as a work example 1 except having prepared pigment slurry whose solid content concentration is 70%.

[Work example 6] As paper pulp, mechanical pulp was not used but the coated paper for gravure was obtained by the same method as a work example 1 except having used paper of fine quality with a basis weight of 54g/m² manufactured only with chemical pulp as coating stencil paper.

[Comparative example 1] Set to preparation of the coating slip of a work example 1. The coated paper for gravure was obtained by the same method as a work example 1 except the glass transition point having changed into the styrene butadiene copolymer latex C 6 copy for photogravures whose glass transition point is 15 degrees C instead of styrene butadiene copolymer latex A for photogravures which is -40 degree C.

[Comparative example 2] 40 copies of engineered kaolin (: with ECLIPS650 by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 66.0%), 30 copies of particle Clay (: with MIRASHEEN by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 60.2%), To the pigment which consists of 30 copies of particle whiting (: with FIMATEC, LTD. make FMT-90 and a volume integral cloth grain size of 0.40-4.20 micrometers 66.3%), it is a dispersant. 0.2 copy of sodium polyacrylate was added with the opposite pigment, the SERIE mixer distributed, and the coated paper for gravure was obtained by the same method as a work example 1 except having prepared pigment slurry whose solid content concentration is 70%.

[Comparative example 3] 60 copies of the 2nd class Clay (: with HS by ENGERU hard company, and a volume integral cloth grain size of 0.40-4.20 micrometers 58.2%), To the pigment which consists of 40 copies of particle whiting (: with FIMATEC, LTD. make FMT-90 and a volume integral cloth grain size of 0.40-4.20 micrometers 66.3%), it is a dispersant. 0.2 copy of sodium polyacrylate was added with the opposite pigment, the SERIE mixer distributed, and the coated paper for gravure was obtained by the same method as a work example 1 except having prepared pigment slurry whose solid content concentration is 70%.

[Comparative example 4] The coated paper for gravure was obtained by the same method as a comparative example 3 except having performed super calender treatment on condition of for 10m/in the roll temperature of 65 degrees C, 2 nip, the calendar linear pressure of 250kg/cm, and **** velocity. The above result was shown in Table 1 and Table 2.

[0024]

[Table 1]

塗工原紙 MP配合率 (%)	塗工用接着剤(部)						ラテックス(部)		
	Eclips650 CapimDG	PMT-90	微粒グリ- Mirasheen	2級グリ- HS	Tg=-40°C	A	B	C	Tg=+15°C
体積分布粒径 0.4~4.2μm(%)	-	66%	68%	67%	60%	58%	-	-	-
実施例1	30	80	-	20	-	-	6	-	-
実施例2	30	80	-	20	-	-	-	6	-
実施例3	30	60	-	20	20	-	6	-	-
実施例4	40	80	-	20	-	-	6	-	-
実施例5	30	-	100	-	-	-	6	-	-
実施例6	-	80	-	20	-	-	6	-	-
比較例1	30	80	-	20	-	-	-	6	-
比較例2	30	40	-	30	30	-	6	-	-
比較例3	30	-	-	40	-	60	6	-	-
比較例4	30	-	-	40	-	60	6	-	-

[Table 2]

	白紙光沢度 (%)	印刷光沢度 (%)	スペックル	密度 (g/cm ³)	不透明度	剛度
実施例1	71.6	76.8	○	1.15	○	○
実施例2	71.1	76.4	○	1.15	○	○
実施例3	72.7	76.0	○	1.15	○	○
実施例4	70.7	75.6	○	1.13	○	○
実施例5	72.1	78.6	○	1.14	○	○
実施例6	74.0	78.9	○	1.15	○	○
比較例1	71.0	76.3	×	1.15	○	○
比較例2	72.9	74.7	×	1.15	○	○
比較例3	65.2	72.1	△	1.15	○	○
比較例4	68.2	75.1	○	1.20	△	△

[0025]

[Effect of the Invention] The coated paper for gravure with the gravure aptitude by which it has high blank paper glossiness and stiffness by a low density, and high opacity and a high speckle have been improved by this invention can be obtained.

[Translation done.]